

A comparative study of management of Colles fracture by closed reduction with cast versus closed reduction with internal fixation.

¹Dr Sumeet Verma, Medical Officer, Department of Orthopaedics, Regional Hospital, Bilaspur, Himachal Pradesh.

²Dr Rakesh Thakur, Medical Officer, Department of Paediatrics, Civil Hospital Barsar, Hamirpur, Himachal Pradesh.

Corresponding Author: Dr Rakesh Thakur, Medical Officer, Department of Paediatrics, Civil Hospital Barsar, Hamirpur, Himachal Pradesh.

Citation this Article: Dr Sumeet Verma, Dr Rakesh Thakur, “A comparative study of management of Colles fracture by closed reduction with cast versus closed reduction with internal fixation”, IJMSIR- December - 2021, Vol – 6, Issue - 6, P. No. 81 – 84.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Background: Distal radius fracture is extremely common fractures treated by orthopaedic surgeons. Near anatomical reduction with restoration of radial length, radial tilt and ulnar variances are important for good functional results.

Methods: There were 25 patients with Colles fractures treated by closed reduction with cast and 25 patients treated with closed reduction internal fixation (PKW/CC screws). We compared both the managements together. The functional outcomes and radiological results were compared between the two groups.

Results: Functionally, for CRIF 10 patients had excellent hand function; 4 patients had good results; 9 patients had a fair outcome, and 2 patients had poor outcome. Functionally, for cast immobilization patients 12 patients had poor outcome, 9 patients had fair outcome, 4 patients had good outcome, nil patients had excellent outcome.

Conclusions: The percutaneous pinning/cc screws and immobilization in neutral position for 3 weeks followed

by physiotherapy proved to be better and simple procedure for extra articular non comminuted distal radius fractures.

Keywords: Fracture radius distal 1/3rd, Cast, Pinning, CC screws, Immobilization

Introduction

Fracture of the distal end radius is one the most common injuries treated by the orthopaedic surgeons. Nearly 18% of all fractures treated by orthopaedic surgeons constitute distal end radius injuries.¹

Restoration of the radial length, radial tilt and ulnar variance are important for good functional results. Failure to achieve the anatomy may lead to degenerative arthritis, radio-ulnar instability, decreased mobility, strength and function.² So in achieving the near anatomy of distal radius the surgical fixation have an increasing demand and better implants for distal end radius are developed.³

Since few years locking plates are being used to fixation which has better stability and good purchase of screws, but the negativity is of soft tissue dissection and fracture site haematoma destruction which can

cause bad healing process.⁴ Percutaneous pinning/cc screws through closed reduction in different patterns was started.

Various techniques of wire insertion through the fracture site and insertion across the fracture site, the former was described by Kapandji in 1976. Kapandji revolutionized intrafocal pinning in which K wires are introduced through the fracture to trap the fragment and are driven into the proximal opposite intact cortex.⁵

The Sauve Kapandji procedure became very popular but for the patients with poor bone quality the sauve kapandji procedure is difficult to perform without reducing the radio ulnar diameter of the wrist. Minimally invasive osteosynthesis techniques and approaches towards soft tissue have become more biological.⁶

There are different options available for the fixation of distal radius fractures. Cannulated cancellous screw technology is one of the options and is best suited to distal radius fractures.⁷

The purpose of this study is to evaluate functional, clinical and radiological effectiveness and drawbacks after closed reduction percutaneous fixation of acute, displaced extra articular and unstable fracture of the distal radius by using a standard 4.0 mm diameter long threaded cannulated screw in indian population. Percutaneous 4 mm cannulated cancellous screw, a new method of fracture fixation with 4 mm cannulated screw applied percutaneously after closed reduction. The screws/k wires gives good purchase to the bone and fixes the fragments. Early mobilization reduces the chance of joint stiffness. It is an inexpensive technique. Closed reduction and percutaneous application reduces the operative risk to the minimum level. With 4 mm diameter it is possible to put two screws instead of one.

Hypothesis being the fixation with cannulated screw/K wire would allow immediate range of motion of the wrist while maintaining alignment, resulting in a rapid and comfortable functional recovery. Although a variety of surgical treatments exist for treating distal radial fractures, closed reduction and the insertion of percutaneous Kirschner wires/CC screws to help maintain fracture reduction is still the popular method.

Methods

Design: Prospective clinical study.

Inclusion criteria

- a) Acute and displaced fractures,
- b) All patients between 20 and 70 years,
- c) Dorsal-angulated fractures (Colles' fractures).
- d) good bone quality,
- e) Extra articular fractures requiring surgical fixation

Exclusion criteria

- a) Previous fractures or nonunions of the wrist,
- b) Bilateral fractures,
- c) Open fractures,
- d) Severe systemic disease with the American society of anaesthesiologists (ASA) physical status grade 3 or more,
- e) Volar-angulated fractures (smith fractures),
- f) Ipsilateral limb injuries, and
- g) Patients who needed help with daily living activities or who were living in nursing homes,
- h) Late injury more than a week,
- i) Associated nerve injury.

There were 50 patients who met the inclusion criteria and were treated by closed reduction with cast and closed reduction (PKW/CC screws). We compared outcomes of both management. The type of fracture was classified according to the AO and Frykman classification.

Results:

Table 1: General characteristics.

Variable	CAST	CRIF	p-value
Mean age	51.21±15.12	50.23±15.02	>0.05
Male:	10: 15	11: 14	>0.05
Female			
Frykman classification (Type 1 :2)	9: 16	10: 15	>0.05

Both groups were comparable.

Table 2: Outcome

Variable	CAST	CRIF	p-value
Outcome (excellent: good: fair: poor)	0:4:9:12	10:4:9:2	0.001
Complication present	20	11	0.001

Functionally, for CRIF 10 patients had excellent hand function; 4 patients had good results; 9 patients had a fair outcome, and 2 patients had poor outcome. Functionally, for cast immobilization patients 12 patients had poor outcome, 9 patients had fair outcome, 4 patients had good outcome, nil patients had excellent outcome.

Discussion

Distal radius fracture is one of the most common injury. Various clinical studies as well as laboratory assessment of force and stress have demonstrated the importance of anatomic reduction.^{8,9}

In fractures with articular displacement greater than 2 mm, radial shortening greater than 5 mm or dorsal angulation greater than 20°, suboptimal results have been reported in previously published studies.⁸

First step in distal radius fracture is reduction and immobilization. The traditional method is closed

reduction and cast immobilization, but this often fails to prevent early radial collapse and is associated with a high risk of malunion, joint stiffness and painful wrist. Hence, this mode of treatment is used for low-demand elderly patients.¹⁰

Radial length and radial inclination can be maintained by ligamentotaxis using external fixators, but palmar tilt is difficult to maintain.¹¹ With the use of external fixators complication rates are high as 60%.¹² These mainly include pin tract infection, pin loosening, sympathetic dystrophy and delayed union. Thus, external fixators are not an option in noncomminuted extra-articular distal radial fractures.¹³

Open reduction and internal fixation techniques should be undertaken in cases of partial, complete and complex intra-articular distal radius fractures.^{14,15} Minimally invasive osteosynthesis has been growing worldwide. Patients who undergo minimally invasive procedure experience small incision scars, minimal blood loss, shorter hospital stay and quick rehabilitation.

To this end, K wires/cannulated screws have been used extensively and are well described in the upper extremity surgery and treatment of distal radial fractures. They are generally used for fixation or reinforcement of radial styloid fractures, but data on the treatment of completely displaced, extra articular metaphyseal fractures are limited.

Conclusion

Percutaneous K wire/CC screw is an effective means of treatment of extra articular distal radius fracture with early to immediate range of motion of the wrist, resulting in a fast early and comfortable functional recovery with anatomical alignment and bone healing. CC screws has good purchase when treating extra

articular distal radius with poor bone quality. Early physiotherapy with immobilization for nearly 3 weeks has good outcomes. Being minimally invasive with minimal soft tissue dissection, less operative time, cost effective. Cannulated screws/percutaneous K wire is a good option for both young and elderly patients with extra articular distal radius fracture.

References

1. Papyrus E. The book of medical knowledge of 16th century BC, egyptinshallamn mikolajczak. *Archieve, History filooz med.* 2004;67(1):5-48.
2. Grammaticos PC, Diamantis A. Useful known and unknown views of the fracture of modern medicine. *Hell J Nucl Med.* 2008;11(1):2-4.
3. David L, Helfet MD, Norbert P. AO Philosophy and principles of Fracture Management, Its Evolution and Evaluation. *J Bone Joint Surgery.* 2003;85(6):1156-60.
4. Simic PM, Wieland AJ. Fractures of the distal aspect of the radius, Changes in treatment over the past two decades. *J Bone Joint Surg (Am).* 2003;85:552-64.
5. Wayne M, Weil MD, Thomas E. Treatment of distal radius fractures with intrafocal (kapandji) pinning and supplemental skeletal stabilization. *Hand Clinic,* 2005;21:317-28.
6. Nalbantoglu U, Gereli A, Kocaoglu B, Turkmen M. Percutaneous Cannulated Screw Fixation in the treatment of distal radius fractures. *Arch Orthop Trauma Surg.* 2012;132:1335-41.
7. Green DP, O'Brien ET. Open reduction of carpal dislocations: indications and operative techniques. *J Hand Surg Am.* 1978;3:250-65.
8. Sarmiento A, Pratt GW, Berry NC, Sinclair WF. Colles' fractures, functional bracing in supination. *J Bone Joint Surg Am.* 1975;57:311-7.
9. Gartland JJ, Jr, Werley CW. Evaluation of healed Colles' fracture. *J Bone Joint Surg Am.* 1951;33:895-907.
10. Knirk JL, Jupiter JB. Intra-articular fractures of the distal end of the radius in young adults. *J Bone Joint Surg Am.* 1986;68:647-59.
11. Trumble TE, Schmitt SR, Vedder NB. Factors affecting functional outcome of displaced intraarticular distal radius fractures. *J Hand Surg Am.* 1994;19:325-40.
12. Jupiter JB, Ring D, Weitzel PP. Surgical treatment of redisplaced fracture of the distal radius in patients older than 60 years. *J Hand Surg Am.* 2002;27:714-23.
13. Chan BK, Leong LC, Low CO, See HF. The use of external fixators in treatment of intra articular fractures of the distal radius. *Singapore Med J.* 1999;40:420-4.
14. Gausepohl T, Pennig D, Mader K. Principles of external fixation and supplementary technique in distal radius fractures. *Injury.* 2000;31:56-70.
15. Sanders RA, Keppel FL, Waldrop JI. External fixation of distal radial fractures: Results and complications. *J Hand Surg Am.* 1991;1